San Joaquin River Basin Plan Amendment Addressing Salinity and Boron

Concurrent Water Quality Issues

Concurrent Water Quality Issues

- Introduction to TMDLs
- NPDES Dischargers
- Salt and Boron TMDL
- Other TMDLs
  - Selenium
  - Dissolved Oxygen
  - Organophosphorous Pesticides

What Is a TMDL and Why Do One?

- TMDL = Total Maximum Daily Load
- TMDLs are required under section 303(d) of the Federal Clean Water Act
  - TMDLs must be developed for pollutants and waterbodies that have been identified on 303(d) list of impaired waterbodies

What Is a TMDL?

- A total maximum daily load (TMDL) is the amount of a specific pollutant that a waterbody can receive and still maintain a water quality standard
- TMDLs allocate pollutant loads to point and nonpoint sources…

What Is a TMDL?

- TMDL= WLA + LA + MOS + background

  WLA: waste load allocation for point sources
  LA: load allocations for nonpoint sources
  MOS: margin of safety

Components of TMDLs

- TMDL Description (Problem Statement)
- Numeric Targets (will often be new water quality objectives)
- Source Analysis
- Allocations
- Linkage Analysis (relationship between sources, allocations, and targets)
- TMDL Report

Components of Basin Plan Amendments

- Beneficial Use Listing
- Establish Water Quality Objectives
- Develop Implementation Plan

Common Elements of Basin Plan Amendments and TMDLs

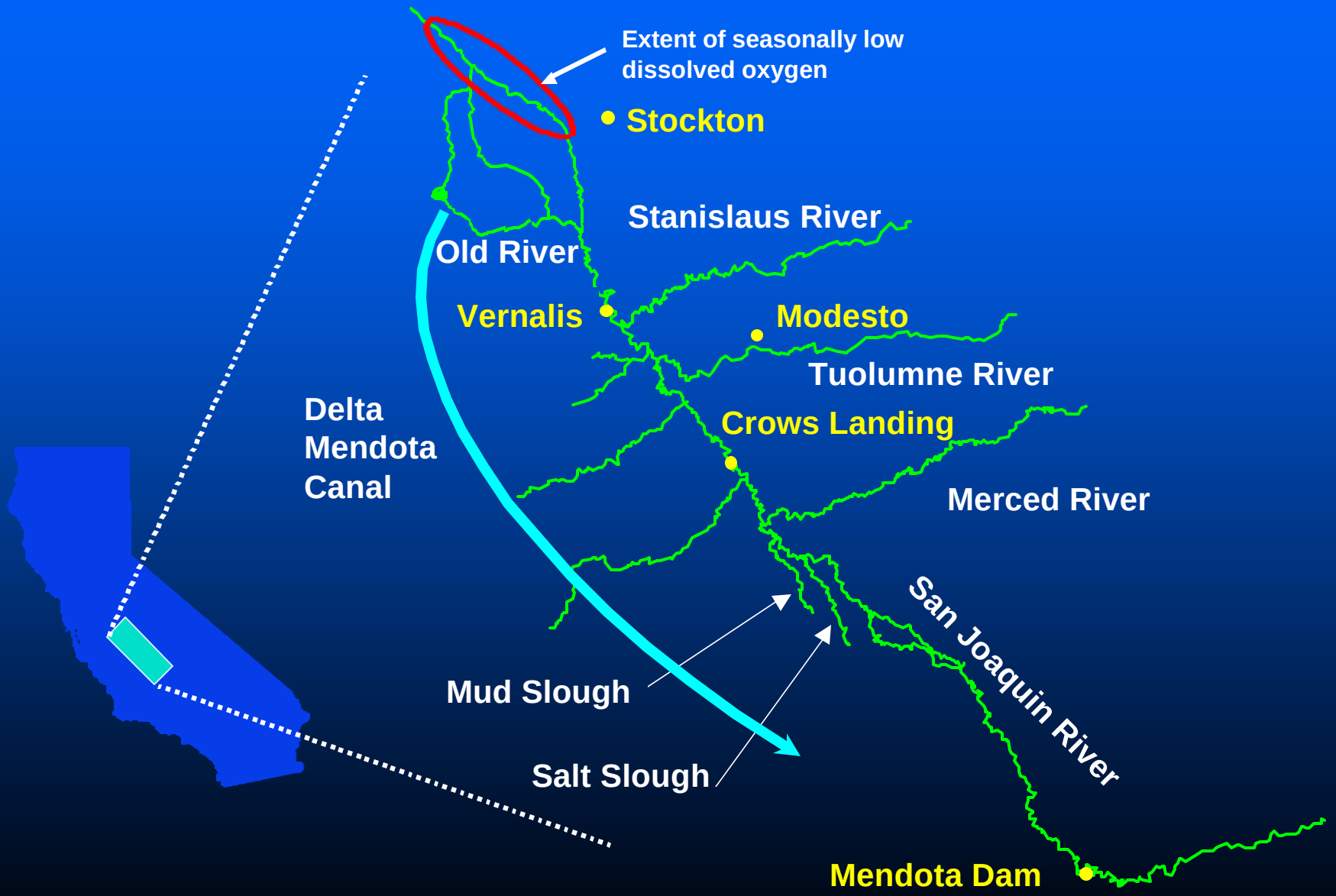
Element	Basin Plan Amendment	TMDL
Impetus	Beneficial use listing	303(d) listing & problem statement
Water quality protection	Water quality objective	Numeric targets
Methods	Source Analysis Models Public Outreach	Source Analysis Models Public Outreach
Product	Implementation Plan	Load Allocations

TMDL Timeline

Current Activities

Watershed	June 2001	June 2002	June 2003
San Joaquin River	Selenium Salt & boron	Diazinon & chlorpyrifos	
Delta			Dissolved oxygen Diazinon & chlorpyrifos Mercury
Sacramento River	Copper, zinc, & cadmium	Diazinon	
Clear Lake	Mercury		
Cache Creek		Mercury	

Lower San Joaquin River Basin

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NPDES DISCHARGES

- Greg K. Vaughn, Senior Engineer
  NPDES Unit chief
- Lower San Joaquin Watershed
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- Point Source Discharges such as municipal wastewater plants can only discharge to surface waters under specific NPDES Permits conditions.

History of NPDES permits

- Regional Boards have been issuing Federal NPDES for in the past 3 decades.
- Why do we seem to be putting more and more effluent limitations in our recent permits?

History of NPDES permits

- More and better data is available
- Data is being used to set permit limitations based on quantifiable problems
- Laboratory detection levels are now lower (we now see concentrations which were reported an ND a few years ago)
- Water quality protection standards are constantly going lower

History of NPDES permits

- First generation of permit concentrated to getting all municipalities to secondary treatment levels
  - BOD
  - Suspended Solids
  - Disinfection
  - De-chlorination
  - General protection of receiving streams for DO, pH, and temperature

History of NPDES permits

- Next generation began to look at toxic constituents such as chlorinated organics and metals
- Next generation began to refine toxic pollutants by looking at lower detection limits, looking at pesticides / herbicides, and looking at unknown toxicity by requiring chronic and acute toxicity testing.

History of NPDES permits

- Today due to adverse comments received by US EPA, environmental groups and water purveyors, we now evaluated all water quality constituents that have a water quality objective. These include:

  - Minerals, hardness, nitrogen components, boron, and other forms of salt.
  - Also now looking at NTR and CTR constituents as mandated by State and Federal Law

What criteria do we use to set limits?

- All permits must protect all beneficial uses as defined in the Region's Basin Plans - past, present and future.

- These beneficial uses include:
  - Critters and wildlife who rely on the stream for life
  - Downstream Drinking water supplies
  - Irrigation supplies – both local and regional

Site Specific Objectives

- There are two site-specific water quality conditions staff evaluates in writing permits.
  - Is there flow in the receiving water to dilute any detrimental effects in the effluent?
  - i.e., Will discharge occur to an ephemeral stream?
  - If so, water quality objectives must be met at the end of the treatment pipe.

Site Specific Objectives

- If there is background flow - Does the receiving water meet water quality objectives,
- i.e., is there assimilative capacity to help dilute the constituent of concern.
  - If not, water quality objectives must be met at the end of the treatment pipe. Since the stream already exceeds water quality objectives.
  - If so, We would look at mixing zone analysis to determine how discharge can occur with no toxic effects in the receiving water.

Site Specific Objectives

- An additional consideration would be a constituent in which the concentration is acceptable but due to its ability to bioaccumulate in the food chain, the discharge mass must be decreased. Examples of the these bioaccumulative constituents:
  - Mercury
  - Lindane
- TMDL's for these constituents are being developed downstream

Let’s Discuss

- Discharges to ephemeral streams
- Discharges to impaired water bodies on the 303d list
- As they relate to Salts, Boron, Selenium, Dissolved Oxygen, and Pesticides

Discussion

- In both cases a point source discharge has to immediately meet the water quality objective at the end of their discharge pipe.
  - For salt – typical effluent limits would be:
    - 450 mg/l TDS for food crops (depending on crop and soil type)
    - 500 mg/l TDS for protection of drinking water sources
  - Pesticides cannot be present in effluent at detectable concentrations

Discussion

- Dissolved oxygen
  - Site specific studies needed to determine maximum BOD
  - Tertiary treatment of wastewater usually necessary
  - An effluent DO limit necessary to overcome BOD.
- Boron, Selenium
  - Usually do not have “reasonable potential” for exceeding water quality criteria.

Discharges to impaired water bodies on the 303d list

- Still have to meet water quality objectives at point of discharge - However
- A time schedule will delay compliance to allow coordination with TMDL effort

Discharges to impaired water bodies on the 303d list

- May be allowed to exceed objectives if:
  - TMDL is successful and assimilative capacity is restored.
  - Pollutant tradeoffs may be allowed in future to clean upstream sources.
  - Point sources may have to treat to lower levels if they are a major contributor to pollutant loading such as BOD (DO problems near Stockton)

Additional Concerns

- Call me to discuss your site specific conditions
- To discuss recent changes to permit because of recently adopted CTR
- Even with TMDL, facilities will be asked to treat wastewater to best practicable treatment to minimize loading to the environment.

Questions and Comments

- Greg K. Vaughn, NPDES Section
- I can be reached in Sacramento
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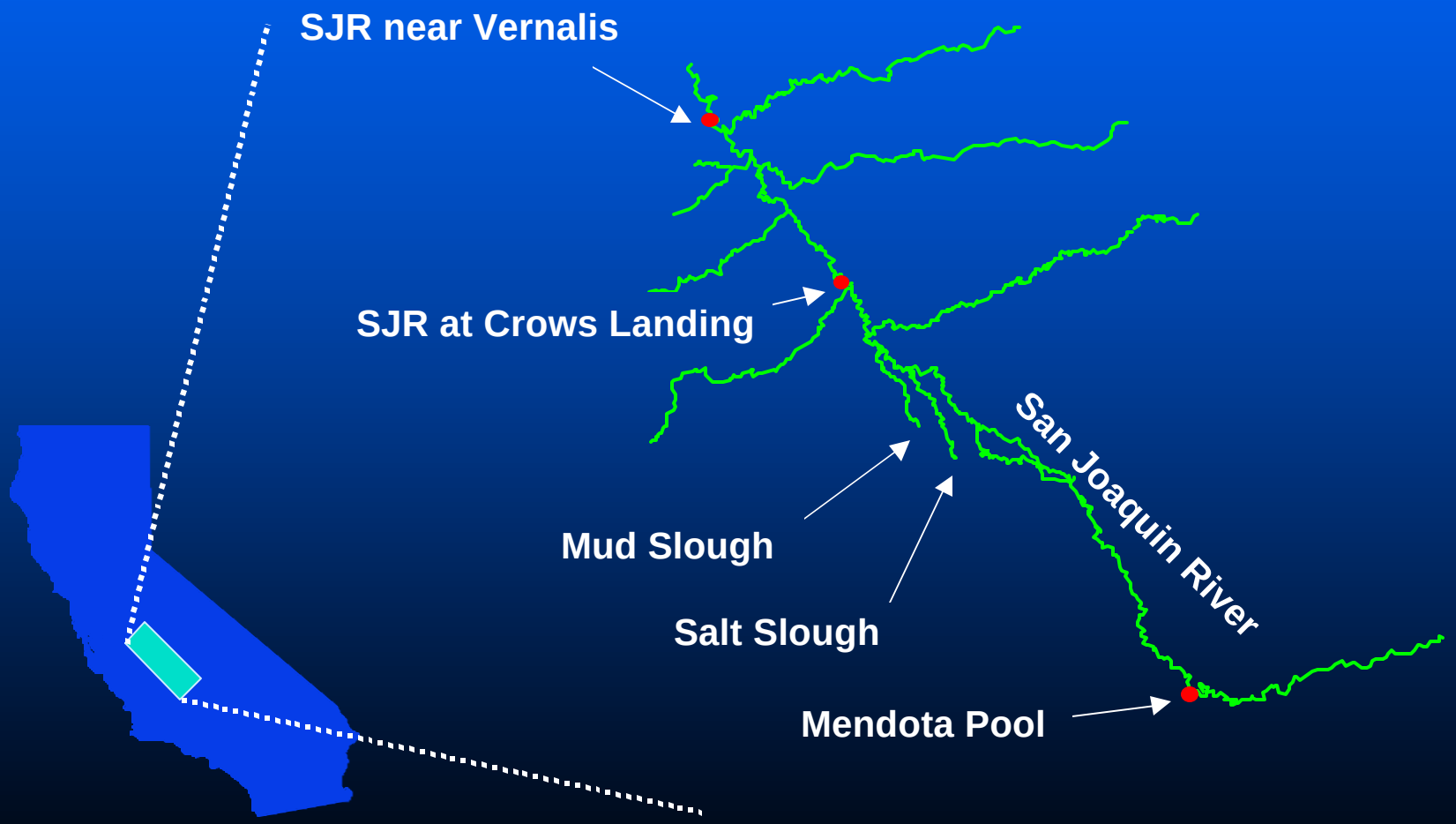
San Joaquin River TMDL for Salinity and Boron

Status and Approaches for TMDL Development

Project Area for Salinity and Boron TMDL



Timelines

- Technical work for the Basin Plan Amendment addressing salinity and boron to be completed by Fall 2000
- Technical work for salinity and boron TMDL to be completed by June 2001

TMDL Components

- Problem Statement ✔
- Numeric Targets ✔
- Source Assessment
- Loading Capacity
- Load Allocations
- Implementation Plan ✔

TMDL Source Assessment

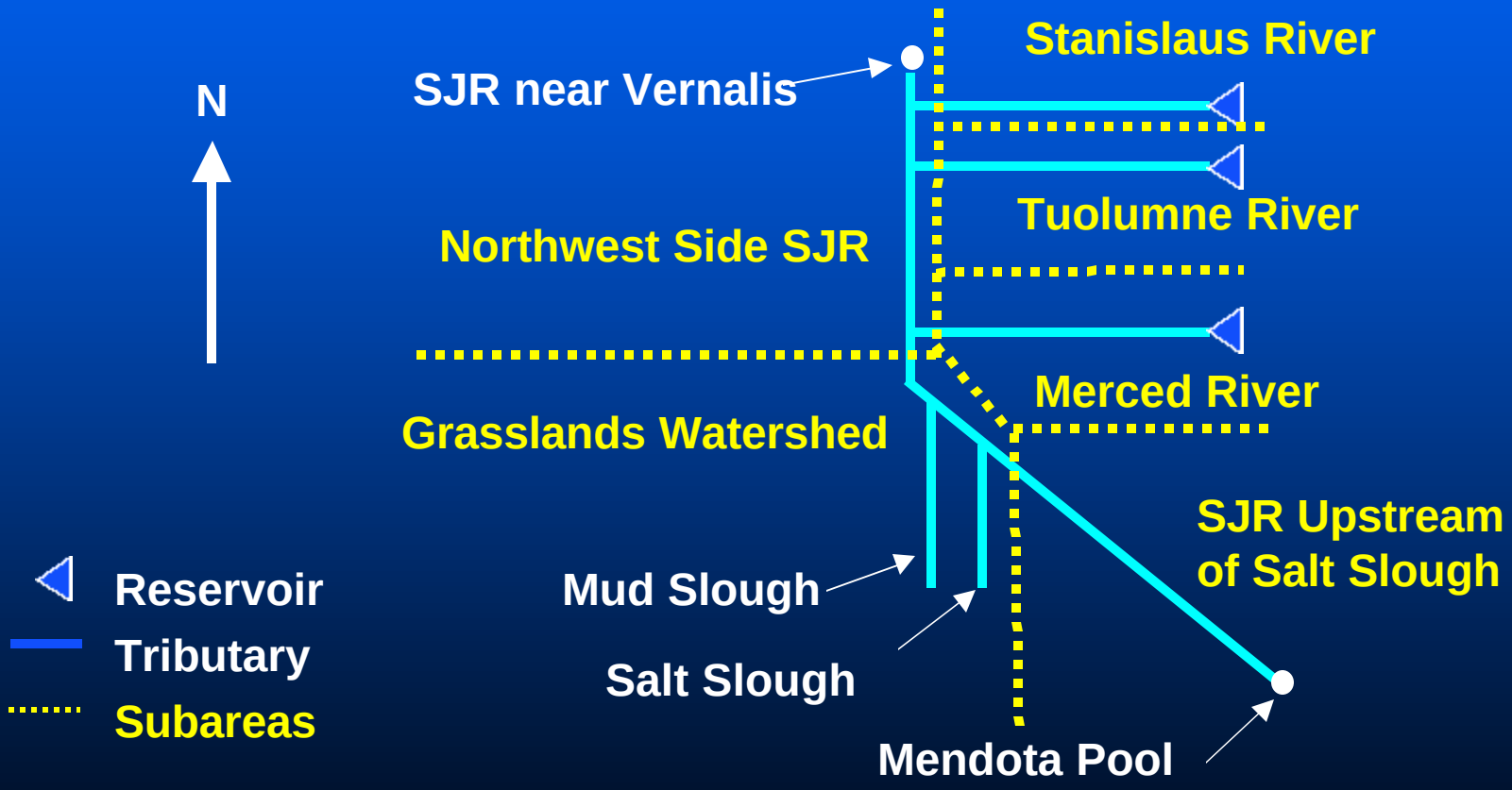
Objective:

Determine the quantity and location of the sources of salt and boron loading in the watershed

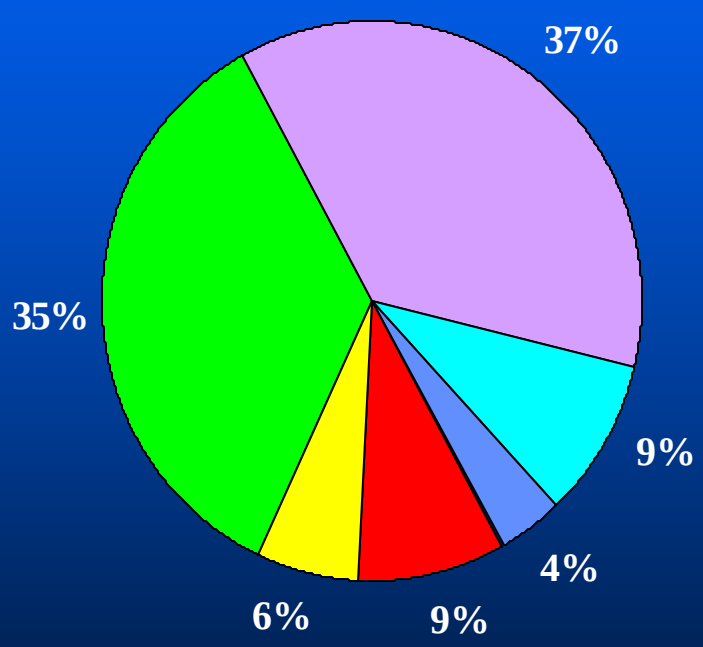
Approach:

- Divide the watershed into geographic sub-areas
- Use monitoring data and modeling to determine loading from sub-areas and source type.
- Partition loading into source categories

Lower San Joaquin River Basin Subareas



Sources of Salt (by sub-area)

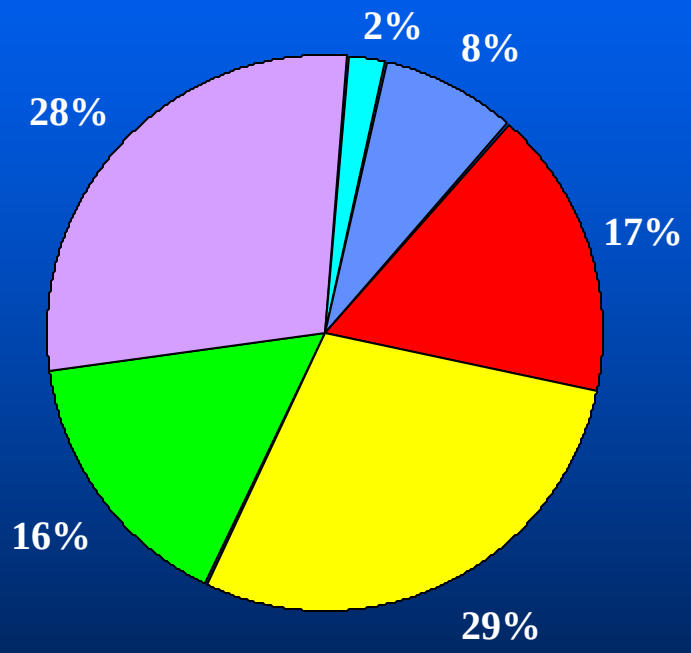


- Northwest Side*
- Grassland Watershed
- SJR Upstream of Lander Avenue
- Merced
- Tuolumne
- Stanislaus

Mean Annual Salt Load to SJR for WY 1977 to 1997: 1.1 million tons

*Northwest Side estimated by difference :Vernalis minus sum of other sources

Sources of Salt (by type)



- Sierra Nevada tributaries
- Groundwater
- Municipal and Industrial
- Wetlands (minimum)
- Subsurface return flows
- Surface return flows

Mean Annual Loading of TDS to SJR for WY 1985 to 1994: 1 million tons

Basis: Historical and SJRIO* model data and spreadsheet analyses

*SJRIO: San Joaquin River Input Output Model

TMDL Loading Capacity and Linkage Analysis

Objective:

- Determine the load reductions needed to achieve water quality targets.
- Establish relationship between pollutant sources and in-stream numeric targets

Approaches being evaluated

Design Flow  Real Time

TMDL Loading Capacity

Design Flow Approach:

- Select a low flow that has desired frequency of occurrence such as 1 in 3 years (e.g. 1 out of 36 months)
- TMDL (Loading Capacity) = WQ objective * design Flow

TMDL Loading Capacity

Real Time Approach:

- Total loading capacity based on real time conditions
- Loading capacity allocated according to a predefined set of parameters
- Load allocations are dynamic

Benefits of Real Time TMDL

- Recognizes that salt and boron do not bioaccumulate
- Recognizes the need to export salts and take advantage of the assimilative capacity of the river while meeting WQ objectives

TMDL Load Allocations

Objective:

- Allocate loads among the various source categories within each of the sub-areas

- Use a Margin of Safety to account for uncertainties in the analyses

TMDL Load Allocations

- Regional Board staff are currently evaluating various load allocation approaches
- Will be seeking input from dischargers on how to equitably allocate loads.

Regional Board Next Steps

- Adopt Basin Plan Amendment (numeric targets)
- Refine source assessment and linkage analysis (determine allowable loading)
- Develop Load Allocations

Questions to the Audience

- Should the Regional Board set up a workshop to specifically to address the salinity and boron TMDL?
- Should the Regional Board establish a framework for stakeholder input to development of load allocations ?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ORGANOPHOSPHOROUS (OP) PESTICIDES TMDL

California Regional Water Quality Control Board Central Valley Region

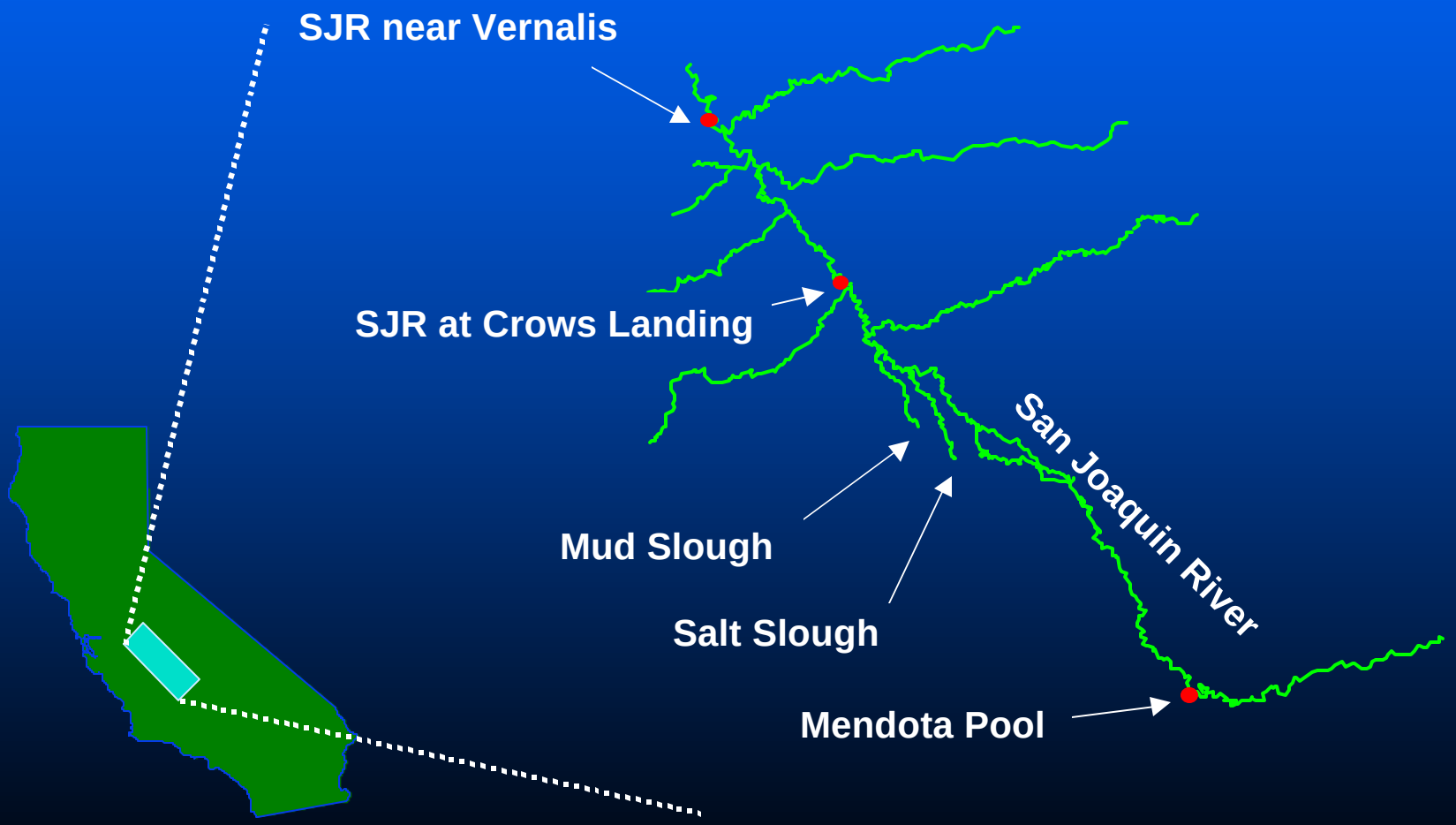
San Joaquin River Watershed
OP Pesticides TMDL

August 16, 2000

BACKGROUND

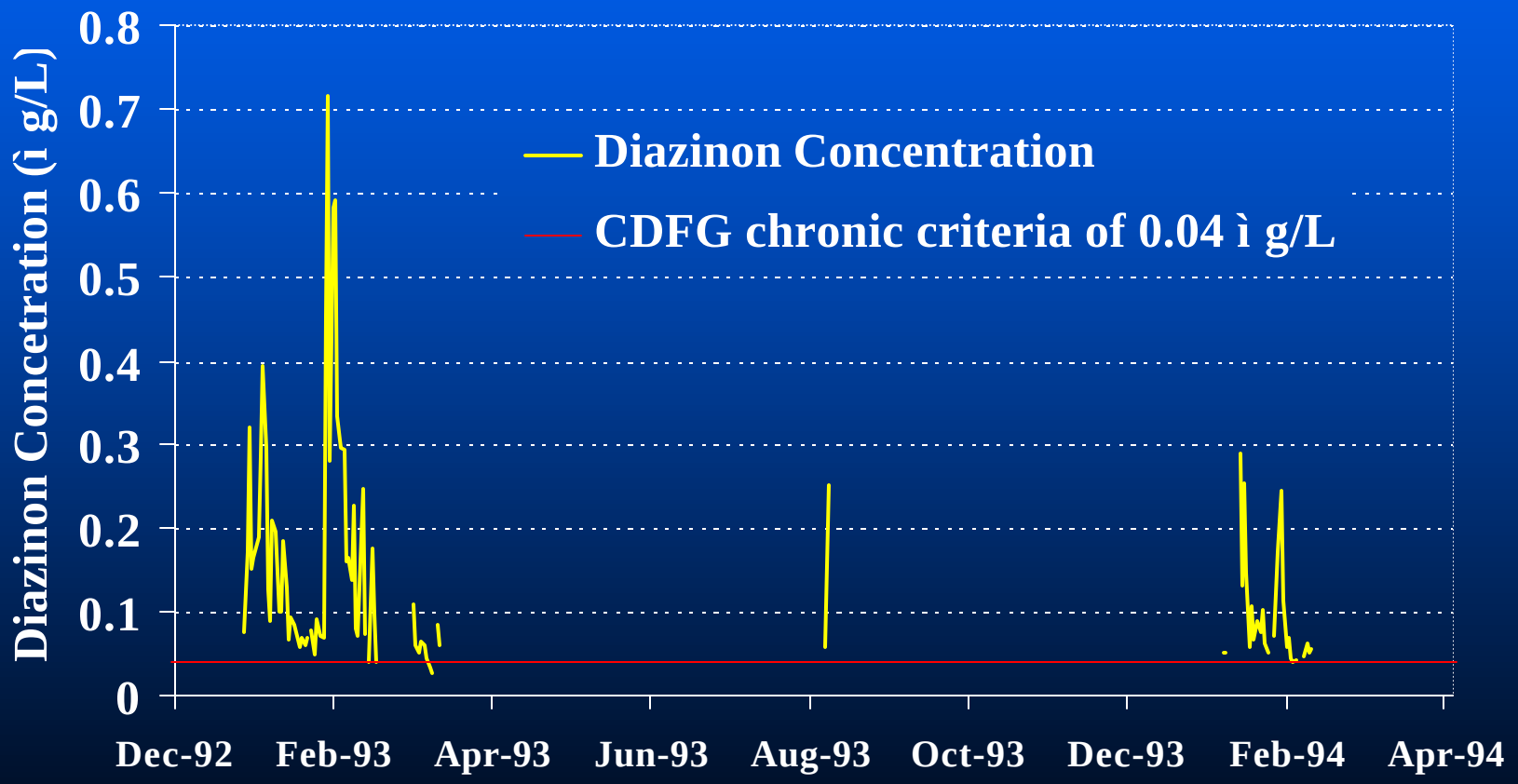
- OP Pesticide Concentrations in the San Joaquin River
- Monitoring Confirmed the Presence of Chlorpyrifos and Diazinon
- TMDL For Chlorpyrifos and Diazinon
- San Joaquin River is Listed in Clean Water Act Section 303(d)
- Project Area

Project Area for OP Pesticides TMDL

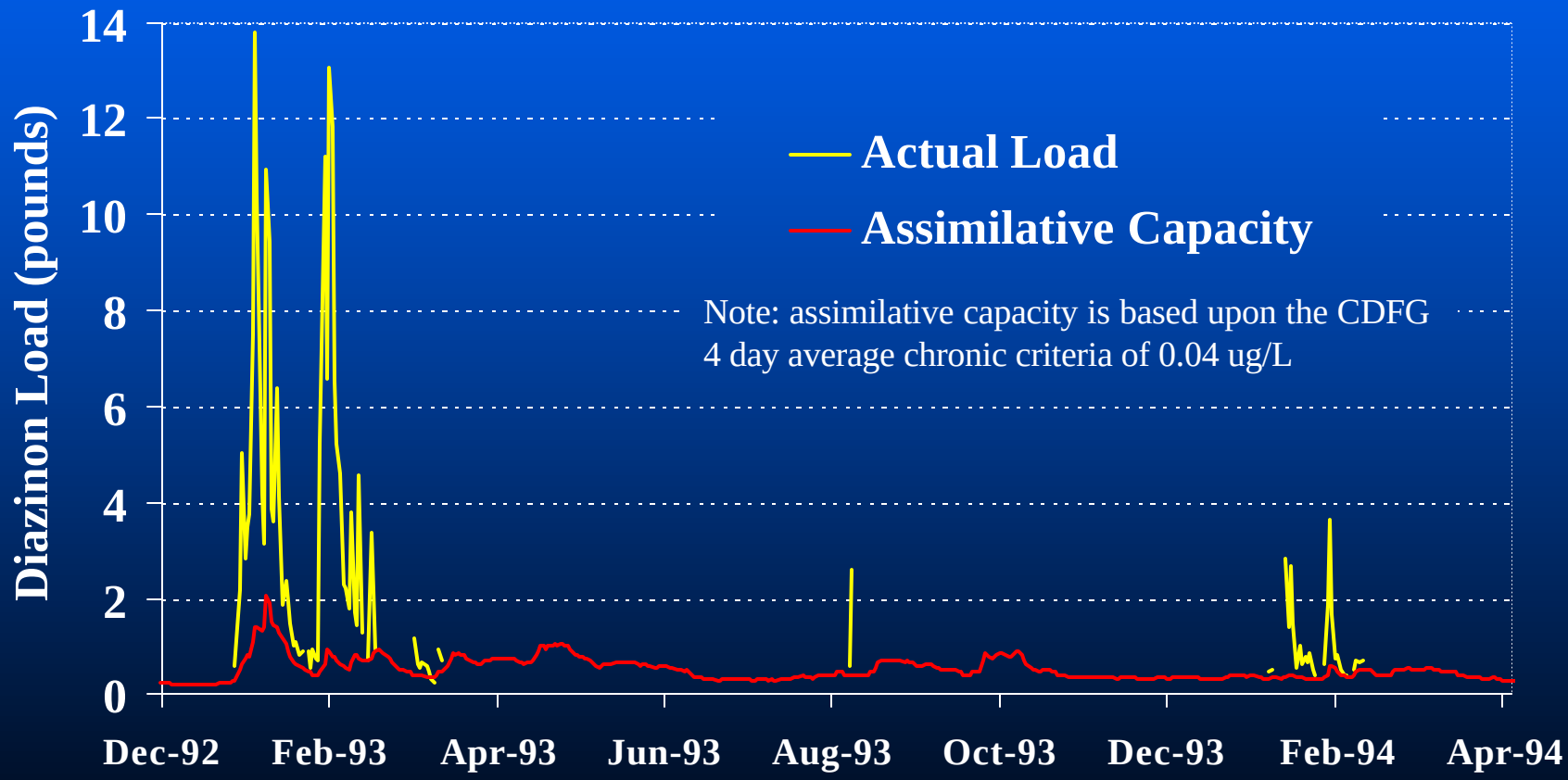


San Joaquin River near Vernalis
Daily Diazinon Concentration

San Joaquin River near Vernalis
Daily Diazinon Concentration



San Joaquin River near Vernalis
Daily Diazinon Load



SOURCES OF CHRORPYRIFOS AND DIAZINON

- Winter stormwater runoff from orchards
- Summer irrigation return flow
- Urban runoff

WATER QUALITY TARGET

- No Established Numeric Water Quality Objectives
- US EPA Criteria
- California Department of Fish and Game Criteria
- Basin Plan Water Quality Objectives

BASIN PLAN NARRATIVE TOXICITY

"All Waters Shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal or aquatic life….."

TMDL DEVELOPMENT UPDATE

- **Problem Statement**
- **Target Reports**
- **Source Analysis**
- *Linkage Analysis*
- *Load Allocations*
- *Implementation Plan*
- **On-going Surface Water Monitoring**

CONCLUSION

- OP Pesticides Contribute to Water Quality Problems in SJR
- OP Pesticide TMDL Reports are High Priority
- Limited Flexibility in Establishing Target
- Implementation Needs to be Consistent With Salt and Boron